REMARKS

Claims 10-18 are pending in the application. Claims 1-9 have been canceled. New claims 10-18 have been added.

Drawings

(a) The drawings have been objected to because reference character "603" has been used to designate both "Bit Demand Analysis" and "buffer fullness analysis module."

Page 7, line 17 of the specification has been amended to overcome this objection.

The Examiner is respectfully requested to reconsider and withdraw this drawing objection.

(b) The Examiner suggests that Figs. 1-3 should be designated by a legend such as --Prior Art--.

As suggested by the Examiner, Figs. 1-3 have been designated by a legend --Prior Art--.

The Examiner is respectfully requested to approve this drawing change.

Specification

(a) The abstract of the disclosure has been objected to because of some informalities.

The abstract of the disclosure has been amended to overcome this objection.

AMENDMENTS TO THE DRAWINGS

Attached hereto are two (2) sheets of corrected drawings that comply with the provisions of 37 C.F.R. § 1.84. The corrected formal drawings incorporate the following drawing changes:

Figs. 1-3 have been designated by the legend --Prior Art--.

It is respectfully requested that the corrected drawings be approved and made a part of the record of the above-identified application.

(b) The disclosure has been objected to because of some informalities.

The specification has been amended to overcome this objection.

Further, minor changes have been made to the specification to place them in better form for U.S. practice.

(c) The Examiner states that the title of the invention is non descriptive.

In order to overcome this objection, the title of the invention has been amended to --CONTINUOUS ESTIMATION AND ADJUSTMENT OF CROSSOVER FREQUENCY TO IMPROVE HIGH-FREQUENCY RECONSRUCTION CODING-- to overcome this objection.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the foregoing objections to the specification.

Claim Objections

(a) Claim 1 has been objected to because it includes acronyms "HFR".

Claim 1 has been canceled. New claims 10-18 have been drafted such that they do not include abbreviations, acronyms, and formula.

(b) Claims 6 and 8 have been objected to as being in improper form.

Claims 6 and 8 have been canceled. New claims 10-18 have been drafted such that they are in proper form.

In view of the above, the Examiner is respectfully requested to reconsider and withdraw these objections.

Claim Rejections

(c) With regard to the Examiner's comment in connection with claim 9, this claim has been canceled.

Claim 9 has been canceled.

In the new claims, the phrase "high-frequency reconstruction" has been used to overcome the Examiner's concerns.

Claim Rejections - 35 U.S.C. § 112

Claim 1 has been rejected under 35 U.S.C. § 112, second paragraph, because it claims both an apparatus and the method steps of using the apparatus.

Claim 1 has been canceled.

New claims have been drafted such that they do not claim both an apparatus and the method steps of using the apparatus.

The Examiner is respectfully requested to reconsider and withdraw this rejection.

Claim Rejections - 35 U.S.C. § 101

Claim 1 has been rejected under 35 U.S.C. § 101 because it claims both an apparatus and the method steps of using the apparatus.

Claim 1 has been canceled.

New claims have been drafted such that they do not claim both an apparatus and the method of using the apparatus.

The Examiner is respectfully requested to reconsider and withdraw this rejection.

Claim Rejections - 35 U.S.C. § 103

Claims 1, 2, and 9 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniguchi et al. ("A high-Efficiency Speech Coding Algorithm based on ADPCM with Multi-Quantizer", Internal Conference on Acoustics, Speech, and Signal Processing, April 1986) in view of Kamai et al. (USP 6,490,562B1).

Claim 3 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniguchi in view of Kamai, and further in view of Moses (USP 5,404,377A). This rejection is respectfully traversed.

Claim 4 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniguchi in view of Kamai, and further in view of Shoham et al. (USP 5,646,961A).

Claim 5 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniguchi in view of Kamai, and further in view of Rossum et al. (USP 5,928,342A).

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniguchi in view of Kamai, and further in view of Herre et al. (USP 6,424,939B1).

The foregoing rejections are respectfully traversed.

Claims 1-9 have been canceled and replaced with new claims 10-18.

Claims 10-16

With regard to claim 1, as filed, the Examiner alleges that the "crossover frequency," recited in claim 1, is determined by the results of equation 3 (Eq. 3) shown in page 1722, left-hand column of Taniguchi.

Applicants respectfully submit, however, that the bandwidth, which is processed by the ADPCM-MQ coder shown in Fig. 1 is determined by the quadrature mirror filter QMF-1, rather than by equation 3. The value determined by equation 3, i.e., Pm, has no relationship with the crossover frequency, as defined in new claim 10 because the crossover frequency, as recited in the preamble thereof, designates the frequency at which a high-frequency reconstruction in a decoder starts. In other words, as claimed in the second paragraph of claim 10, the crossover frequency is the frequency, which forms the upper limit of the lower frequency band of the audio signal, processed by the core encoder.

The value Pm, as defined in equation 3, is the "power difference between the locally decoded signal in each ADPCM coding block and the input signal (the quantisation error power)" as stated in the left-hand side column of page 1722, lines 9-12. Thus,

equation 3 is used to select the optimum ADPCM encoder from the set of different ADPCM encoders for a certain signal x at the input shown in Fig. 2. Nevertheless, the bandwidth of the upper cut-off frequency of the signal x is fixed and determined by the filter QMF-1 shown in Fig. 1. In other words, the selection of the optimum ADPCM encoder, which is carried out using equation 3, does not change anything at the crossover frequency. The signal x, having a certain cut-off frequency, determines the selection of the optimum ADPCM encoder.

Therefore, equation 3 has no relationship with a crossover frequency claimed in second and third paragraphs of claim 10.

In the second paragraph of page 7 of the Office Action, the Examiner states that the crossover frequency has something to do with equation 3 in the left-hand side column of page 1722 of Taniguchi. This assertion is not correct as stated in the foregoing.

In page 7, third paragraph of the Office Action, the Examiner states that Taniguchi teaches the step of detecting the value of a crossover frequency by referring to the left-hand side column on page 1722 of Taniguchi. Instead, the crossover frequency, i.e., the cut-off frequency of the quadrature mirror filter QMF-1, shown in Fig. 1, is fixed and the passage in the left-hand side column on page 1722, cited by the Examiner, is used for determining an

optimum ADPCM coding block for a give input signal x having fixed crossover frequency.

In summary, Taniguchi does not encode "a lower frequency band of the audio signal up to the crossover frequency, the crossover frequency being variable, and the core encoder being operable on a block-wise frame by frame basis." Accordingly, Taniguchi does not disclose or suggest the "core encoder" as recited in claim 10.

Additionally, Taniguchi also does not disclose or suggest any of limitations recited in the third paragraph of claim 10, namely, the "crossover frequency control module," as recited in claim 10. The Examiner concedes that Taniguchi does not disclose or suggest that the crossover frequency is adaptively detected over time.

Taniguchi does not disclose or suggest that the crossover frequency control module estimates, dependent on a measure of the degree of difficulty for encoding the audio signal by the core encoder and/or dependent on a boarder between a tonal and a noise-like frequency range of the audio signal.

Kamai is directed to a method and system for analyzing voices, which can assign pitch marks more simply and more properly and a method and medium for synthesizing higher quality voices (see col. 2, lines 32-37 of Kamai). As outlined in col. 2, lines 48-53, Kamai discloses changing a cut-off frequency or a center frequency of an adaptive filter according to a rough pitch information, so that only the fundamental component extracted from an entered voice wave

from is passed through the adaptive filter. The output of the adaptive low-pass filter 1003, shown in Fig. 1 of Kamai, is then input to a peak detector 1004, which obtains a 0-cross position, which is used as a pitch mark information, as indicated in col. 6, lines 66-67 of Kamai. The pitch mark information is then used together with some additional information to control a pitch wave overlay function shown in Fig. 12. Then, by using the pitch mark information as defined in Fig. 13, the voice is finally output by overlaying several stored wave forms selected by some information, which also includes the pitch mark information, as outlined in col. 13, lines 43-45.

In summary, the pitch mark derived from an output of an adaptive filter has nothing to do with a crossover frequency to be used by a decoder for performing a high-frequency reconstruction for a frequency range above the crossover frequency, but is one of several control parameters for synthesizing the voice, as discussed above. Additionally, the cut-off frequency or center frequency of the adaptive filter in Kamai has no relationship with the functionality of a core encoder for encoding a lower frequency band of an audio signal up to the crossover frequency, as recited in the second paragraph of claim 10, namely, the "core encoder." Instead, the cut-off frequency or center frequency of the adaptive filter in Kamai is only used to extract some pitch mark information, but is not used to encode the lower frequency band of the audio signal in

order to obtain an encoded audio signal to be used by a high-frequency reconstruction module in a decoder.

Additionally, Taniguchi shows, in Fig. 2, an audio coder, which performs some quantisation, wherein the kind of quantisation, i.e., the optimum ADPCM coding block is determined by equation 3 of Taniguchi, while Kamai is a fully parametric speech encoder, which does not use any quantisation, but fully parameterizes an input signal and send some parameters to a decoder or speech synthesizer, which performs a kind of table look-up using the transmitted information in order to overlay pre-stored wave forms. Therefore, the quantisation-based encoder in Taniguchi and the parametric speech processor in Kamai are in contrast to each other and exclude each other. In other word, one teaches away the other. Therefore, it would not make sense to use any information from Kamai with respect to the pitch mark information for quantisation purpose as disclosed in Taniguchi.

Applicants also wish to note that Kamai is completely silent as to determining the pitch mark information independent on a measure of a degree of difficulty for encoding the audio signal and/or dependent on a border between a tonal and a noise-like frequency range of the audio signal. Instead, the pitch mark information or the cut-off frequency or center frequency of the adaptive low-pass filter solely depends on the actual pitch of the

input signal rather than the difficulty for encoding or a border between a tonal and the noise-like frequency range.

In view of this, neither Taniguchi nor Kamai discloses or suggests "estimating, dependent on at least one of a measure of the degree of difficulty for encoding the audio signal by the core encoder and a boarder between a tonal and a noise-like frequency range of the audio signal, the crossover frequency to be selected by the core encoder for a frame of series of subsequent frames, so that the crossover frequency is variable adaptively over time for the series of subsequent frames."

Therefore, even assuming, *arguendo*, that Taniguchi and Kamai can be combined, Taniguchi in view of Kamai fails to disclose or even suggest the "crossover frequency control module" as recited in claim 10.

Claims 11-15, dependent on claim 10, are allowable at least for their dependency on claim 10.

Claim 16 is allowable at least for the similar reasons as stated in the foregoing with respect to claim 10.

Claims 17 and 18

As stated in the forgoing with respect to claim 10, Taniguchi does not disclose or suggest transmitting any information on the variable crossover frequency, and, therefore, does not teach any bit stream demultiplexer feature.

Additionally, Taniguchi does not receive "the information on the variable crossover frequency and for generating a replicated high-band signal. Therefore, Taniguchi does not disclose or suggest the "transposition module" as recited in claim 17.

Claim 18 is allowable at least for the similar reasons as stated in the foregoing with respect to claim 17.

The Examiner is respectfully requested to reconsider and withdraw this rejection.

Conclusion

Accordingly, in view of the above amendments and remarks, reconsideration of the rejections and objections, and allowance of the pending claims are earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Maki Hatsumi (Reg. No. 40,417) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachments